

Mean Areas and Heliographic Latitudes of Sun-spots in the year 1890, deduced from Photographs taken at Greenwich, at Dehra Dûn (India), and in Mauritius.

(Communicated by the Astronomer Royal.)

The results here given are in continuation of those printed in the *Monthly Notices*, vol. l. p. 378, and are deduced from the measurements of solar photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn, India, and at the Royal Alfred Observatory, Mauritius.

Table I. gives the mean daily areas of umbræ, whole spots, and faculæ, for each synodic rotation of the Sun in 1890; and Table II. gives the same particulars for the entire year. The areas are given in two forms: First, projected areas, that is to say, as seen and measured on the photographs, these being expressed in millionths of the Sun's apparent disc; and next, areas as corrected for foreshortening, the areas in this case being expressed in millionths of the Sun's visible hemisphere. Table III. exhibits for each rotation in 1890 the mean daily area of whole spots, and the mean heliographic latitude of the spotted area, for spots north and for spots south of the equator, together with the mean heliographic latitude of the entire spotted area, and the mean distance from the equator of all spots; and Table IV. gives the same information for the year as a whole.

TABLE I.

No. of Rotation.	Date of Commencement of each Rotation.	d	No. of Days on which Photographs were taken.	Mean of Daily Areas.					
				Projected.	Corrected for Foreshortening.				
				Umbræ.	Whole Spots.	Faculæ.	Umbræ.	Whole Spots.	Faculæ.
485	1890 Jan.	1·19	28	8·4	47·8	180	7·2	45·3	213
486	Jan.	28·54	27	0·8	3·3	54·0	0·5	2·2	71·8
487	Feb.	24·87	26	16·9	94·1	229	14·1	83·7	264
488	Mar.	24·19	28	0·8	8·7	45·9	0·5	5·5	52·1
489	Apr.	20·47	27	4·6	33·3	81·1	3·0	23·0	93·5
490	May	17·70	27	3·7	22·8	130	2·9	17·1	152
491	June	13·90	27	13·3	78·2	140	11·0	68·4	155
492	July	11·10	26	24·9	150	238	19·2	115	296
493	Aug.	7·31	28	59·0	394	142	36·3	241	156
494	Sept.	3·56	26	26·3	176	489	22·6	160	536
495	Sept.	30·83	27	47·7	316	604	36·2	247	598
496	Oct.	28·12	28	18·1	104	626	16·1	96·9	658
497	Nov.	24·43	26	60·9	344	520	38·4	224	644

TABLE II.

Year.	No. of Days on which Photographs were taken.	Mean of Daily Areas.					
		Projected.	Corrected for Foreshortening.				
		Whole Spots.	Umbrae.	Faculae.	Whole Spots.	Umbrae.	Faculae.
1890	361	133	21·3	273	99·4	15·5	304

The rotations in Table I. and Table III. are numbered in continuation of Carrington's series (Observations of Solar Spots, made at Redhill, by R. C. Carrington, F.R.S.), No. 1 being the rotation commencing 1853 November 9. The assumed prime meridian is that which passed through the ascending node at mean noon on 1854 January 1, and the assumed period of the Sun's sidereal rotation is 25·38 days. The dates of the commencement of the rotations are given in Greenwich civil time, reckoning from mean midnight.

TABLE III.

No. of Rotation.	Date of Commencement of each Rotation.	No. of Days on which Photographs were taken.	Spots North of the Equator.		Spots South of the Equator.		Mean Heliographic Latitude of Entire Spotted Area.	Mean Distance from Equator of all Spots.
			Mean of Daily Areas.	Mean Heliographic Latitude.	Mean of Daily Areas.	Mean Heliographic Latitude.		
485	1890 Jan. 1 ^d 19	28	34·4	22°54	10·9	10°72	+ 14·58	19°71
486	Jan. 28 ^d 54	27	2·2	24·47	0·0	...	+ 24·47	24·47
487	Feb. 24 ^d 87	26	82·9	32·76	0·8	30·43	+ 32·15	32·74
488	Mar. 24 ^d 19	28	2·6	25·55	3·0	26·28	— 2·21	25·94
489	Apr. 20 ^d 47	27	8·3	24·37	14·7	28·02	— 9·04	26·70
490	May 17 ^d 70	27	2·0	20·97	15·1	26·79	— 21·30	26·12
491	June 13 ^d 90	27	0·0	...	68·4	23·58	— 23·58	23·58
492	July 11 ^d 10	26	32·0	18·28	83·0	11·55	— 3·22	13·39
493	Aug. 7 ^d 31	28	231	21·20	9·3	19·67	+ 19·66	21·17
494	Sept. 3 ^d 56	26	88·8	21·39	70·9	21·33	+ 2·43	21·37
495	Sept. 30 ^d 83	27	4·0	20·47	243	23·08	— 22·37	23·03
496	Oct. 28 ^d 12	28	27·4	19·49	69·5	23·94	— 11·67	22·68
497	Nov. 24 ^d 43	26	190	20·10	33·8	27·81	+ 12·87	21·26

TABLE IV.

Year.	No. of Days on which Photographs were taken.	Spots North of the Equator.		Spots South of the Equator.		Mean Heliographic Latitude of Entire Spotted Area.	Mean Distance from Equator of all Spots.
		Mean of Daily Areas.	Mean Heliographic Latitude.	Mean of Daily Areas.	Mean Heliographic Latitude.		
1890	361	53·1	22°20	46·3	21°75	+ 1°73	21°99

The above tables, when compared with those given on pp. 378 and 379 in volume I., show clearly that the Sun-spot minimum is already past, a conclusion which is abundantly con-

firmed by the rapid increase in the numbers and areas of spots and faculæ seen during the present year, 1891. The tendency for spots to form in high latitudes, which was noticed towards the end of 1889, continued throughout 1890, the mean distance from the equator of all spots in 1890 being $21^{\circ}99$, as compared with $11^{\circ}61$ in 1889 and $7^{\circ}39$ in 1888. This difference is due chiefly to the nearly total disappearance of spots from the immediate neighbourhood of the equator in 1890, for only one considerable group during the entire year, that of July 22—August 1 had a lower latitude than 18° ; at the same time the spots of the new series, that is to say, of the high-latitude zones, north or south, were much more numerous than in 1889 and maintained as great a distance from the equator.

The northern hemisphere showed a slight preponderance over the southern as to spot activity in 1890, for the first time since 1881.

Observations of Wolf's Periodical Comet (b 1891) made at the Royal Observatory, Greenwich.
(Communicated by the Astronomer Royal.)

The observations were made with the East, or Sheepshanks, Equatoreal, aperture 6·7 inches, by taking transits over two cross wires at right angles to each other, and each inclined 45° to the parallel of declination. Magnifying power about 200 on October 2, 3, 4, and 55 on October 9, 12, and 14.

Nov. 1891.

Greenwich Observations of Comet.

Greenwich Mean Solar Time.	Observer.	— * RA.		Corr. for Parallax.	Corr. for Refraction.	— * N.P.D.	Corr. for Parallax.	Corr. for Refraction.	No. of Comps.	Apparent R.A.		Tabular R.A.		Apparent N.P.D.	Tabular N.P.D.	Comp. Star.
		m	s							h	m	s	h			
Oct. 2 11 8 41	T.	+0	37·0	-0·4	0·0	-13 23·2	-7·3	-0·3	1	4 28	13	4 28	13	76 41·7	76 41·7	a
11 17 13	"	+2	49·9	-0·4	0·0	-10 39·0	-7·3	-0·1	6	4 28	16·4	4 28	13	76 42 11·6	76 41·7	b
11 23 38	"	+2	1·3	-0·4	0·0	-7 7·2	-7·2	0·0	4			4 28	14	76 41·8	76 41·8	c
3 11 30 36	A.C.	-0	13·6	-0·4	0·0	+2 25·7	-7·3	0·0	4			4 29	20		77 11·7	d
11 33 56	"	+1	39·5	-0·4	0·0	+13 31·0	-7·2	+0·2	3	4 29	20·5	4 29	20	77 11 44·2	77 11·8	e
4 10 41 47	H.	-1	41·9	-0·4	0·0	-1 20·5	-7·6	0·0	6	4 30	23·8	4 30	21	77 40 50·1	77 40·7	f
10 53 33	"	-0	57·6	-0·4	0·0	-2 44·9	-7·5	0·0	3			4 30	21		77 40·9	g
9 11 27 34	T.	+5	19·0	-0·4	0·0	+13 40·2	-7·6	+0·3	2	4 34	57·0	4 34	56	80 16 32·8	80 16·2	h
11 27 34	"	+5	14·5	-0·4	0·0	+13 3·3	-7·6	+0·3	2	4 34	56·1	4 34	56	80 16 28·8	80 16·2	k
12 10 42 46	H.	+1	48·0	-0·4	0·0	-3 55·1	-8·0	-0·1	6	4 37	7·2	4 37	3	81 51 32·0	81 51·2	l
10 51 16	"	+1	26·1	-0·4	0·0	-0 35·3	-8·0	0·0	2			4 37	4	81 51·4	81 51·4	m
11 6 8	"	-0	34·1	-0·4	0·0	-3 29·8	-7·9	0·0	2			4 37	4	81 51·7	81 51·7	n
14 11 10 35	L.	+1	17·3	-0·4	0·0	+14 30·6	-8·0	+0·4	2	4 38	19·6	4 38	16	82 56 58·9	82 56·6	o
11 10 35	"	+0	33·6	-0·4	0·0	+12 55·7	-8·0	+0·3	2			4 38	16	82 56·6	82 56·6	p